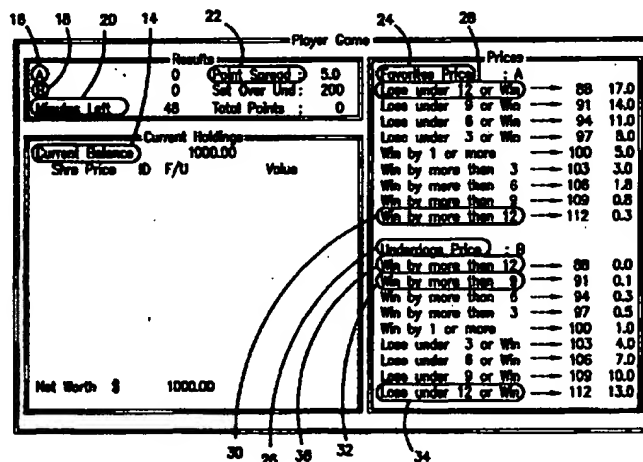




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(54) Title: SPORTING EVENT OPTIONS MARKET TRADING GAME



(57) Abstract

A commodities option trading game is provided in which the simulated market, which determines whether the value of the simulated commodities options rise or fall, is determined by a real event occurring outside the game being played. In a preferred embodiment, the event from which the simulated market is derived is a real life sporting event, such as a professional basketball, football, or baseball game. Preferably a host calculator or computer (10) generates the initial option prices and displays the information to a plurality of player stations (12). After play begins, the host computer updates the options prices (24, 26) using formulae based on the current score (16, 18), time remaining (20), and other empirically determined factors. The players buy and sell options in response to the momentum of the market. At the conclusion of the sporting event, the options are cashed in for their intrinsic value and the player with the most accumulated wealth is declared the winner.

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SPORTING EVENT OPTIONS MARKET TRADING GAME

Background of the Invention

This invention relates to games, particularly to options market trading games. An option, of the type traded in a commodities market, is nothing more than a right (either to buy or sell) a particular commodity at a fixed price (called the settlement or "strike" price) at some time in the future. A call option is the right to buy the commodity in the future. A put option is the right to sell the commodity in the future. An option holder is the person who owns the right conveyed by the option. The option writer is the person who will have to perform (e.g. buy or sell at the fixed price) in accordance with the right granted by the option.

The intrinsic (or cash settlement) value of an option is equal to the difference between the settlement price of the option and the market value of the commodity. For example, a call option with a settlement price of \$50 has an intrinsic value of \$10 if the value of the commodity is currently \$60, because the holder of the option could theoretically force the writer of the option to deliver \$60 worth of the commodity for \$50. Similarly, a put option with a settlement price of \$50 has an intrinsic value of \$10 if value of the commodity is currently \$40, because the option holder could theoretically force the writer of the option to buy \$40 worth of the commodity for \$50. It is important to note that the intrinsic value of the option represents only the difference between the strike price and the current value of the commodity and does not reflect the price of the commodity itself. Thus a put option with a settlement price of \$500 would still have an intrinsic value of only \$10 if the value of the commodity was currently \$490.

Options also have "time value," that is, options generally trade at some premium over their intrinsic value

as dictated by market forces. The amount of the time value premium depends on a multitude of factors including the remaining life of the option (all options expire at some point in time) and the volatility of the particular commodity. For example, if the value of a commodity is currently \$60, a call option with a settlement value of \$50 has an intrinsic value of \$10, but may trade at \$12 in the open market. The \$2 premium reflects the time value of the option.

The field is replete with various stock market and options market trading games. United States Patent No. 5,139,269 to Peterson, discloses a board game in which a token is advanced around a board based on a roll of the dice. The market events that determine whether the player will realize a profit or loss are based upon the position of the tokens on the board and/or subsequent rolls of the dice. United States Patent No. 4,378,942 to Isaac discloses a game in which the players buy and sell options with a "broker" for a predetermined period, after which the market events that determine whether the player will realize a profit or loss are determined by randomly drawn cards and tokens. United States Patent No. 4,948,145 to Breslow discloses a game in which the market events are determined by spinning a spinner. In all of the prior art games, however, the market events are purely random, and therefore, the games lack a certain realism that would be inherent if the market events were determined by a real event.

It is a principal object of the present invention to provide an options trading game with enhanced realism, specifically to provide an options trading game in which the market events are determined by a real event occurring outside the game being played.

Summary of the Invention

The present invention comprises an options trading game in which the simulated market, which determines whether the value of a commodities option rises or falls, is determined by a real event occurring outside the game being played. In a preferred embodiment, the event from which the simulated market is derived is a real-life contest, preferably a sporting event, such as a professional basketball, football, or baseball game. Preferably a host calculator or computer generates the initial option prices. This "host" computer then provides the information to a plurality of player stations, which could be additional computers, "dumb" terminals, television sets (or a portion thereof), or other conventional display means (hereinafter referred to as player "terminals"). At the beginning of play, each player is given a predetermined number of units (dollars) to spend on options. In a preferred embodiment, the host computer permits trading to take place before the beginning of the sporting event, during time outs, and during other breaks in the action, thus enabling the players to buy and sell their options throughout the event, yet still enjoy viewing the sporting event. However, continuous trading throughout the sporting event is also within the scope of the present invention. After play begins, the host computer updates the options prices using formulae based on the current score (as used herein, "score" means points scored by each team, total points scored by all teams, lead time between any two competitors in a race, number of hits, number of errors, shots on goal, or any other quantifiable representation of the progress of a contest), together with such parameters as, time remaining (or in the case of baseball, innings remaining), and a variety of other empirically determined factors, such as field position, downs remaining, yards to a first down, runners on base, balls and strikes, and number of outs. At the conclusion of the sporting event, the

options are cashed in for their intrinsic value (i.e. their cash settlement value) and the player with the most accumulated wealth is declared the winner. Since, according to the present invention, the prices of the options
5 fluctuate in response to the momentum of the sporting event, rather than in response to a purely random input, the game of the present invention adds a realism that cannot be achieved by a game that simulates the market by purely random means.

10 Brief Description of the Drawings

The above and other objects, aspects, features and attendant advantages of the present invention will become apparent from a consideration of the ensuing detailed description of presently preferred embodiments and methods
15 thereof, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is an illustration of a host computer and a network of player terminals according to an embodiment of the present invention.

20 FIG. 2 is an illustration of a player terminal screen at the beginning of a game played according to an embodiment of the present invention.

FIG. 3 is a summary of formulae for calculating the simulated "favorite" commodities options prices of FIG. 2
25 and the results.

FIG. 4 is a summary of formulae for calculating the simulated "underdog" commodities options prices of FIG. 2 and the results.

FIG. 5 is an illustration of the player terminal screen
30 according to the embodiment of FIG. 2 at a point in time during the sporting event.

FIG. 6 is a summary of formulae for calculating the simulated "favorite" commodities options prices of FIG. 5 and the results.

FIG. 7 is a summary of formulae for calculating the simulated "underdog" commodities options prices of FIG. 5 and the results.

5 FIG. 8 is an illustration of a player terminal screen at the beginning of a game played according to a second embodiment of the present invention.

FIG. 9 is a summary of formulae for calculating the simulated "over" commodities options prices of FIG. 8 and the results.

10 FIG. 10 is a summary of formulae for calculating the simulated "under" commodities options prices of FIG. 8 and the results.

FIG. 11 is an illustration of the player terminal screen according to the embodiment of FIG. 8 at a point in
15 time during the sporting event.

FIG. 12 is a summary of formulae for calculating the simulated "over" commodities options prices of FIG. 11 and the results.

FIG. 13 is a summary of formulae for calculating the
20 simulated "under" commodities options prices of FIG. 11 and the results.

FIG. 14 is an illustration of a player terminal screen at the end of a game played according to the embodiment of the present invention of FIGs. 2-7.

25 FIG. 15 is an illustration of a player terminal screen at the end of a game played according to the embodiment of the present invention of FIGs 8-13.

Description of Preferred Embodiments and Methods

30 The present invention comprises an options trading game in which the game's simulated market moves in response to occurrences in a real life event happening outside the game, such as in a sporting event. As shown in FIG. 1, in a preferred embodiment, a "host" calculator or computer 10 generates the options prices. This host computer then

provides the information to a plurality of player computers or terminals 12 via Local Area Network, Wide Area Network, or other computer networks such as are well known in the computer field.

5 FIG. 2 is an exemplary player's terminal display. At the beginning of play, each player is given a predetermined number of units (dollars) to spend on options, for example, \$1,000 as shown at reference 14 of FIG. 2. In the embodiment of the present invention shown in FIG. 2, the
10 sporting event used to simulate the market is a basketball game between team A 16 which is a 5 point favorite over team B 18. The sporting event has not yet commenced. Accordingly, the time remaining 20 is 48 minutes (the total time of a regulation basketball game). Referring to the
15 favorite's price column 24 the player learns that team A is the favorite and that team B is the underdog as indicated in the underdog's price column 26. Referring to the point spread 22 the player learns that the favorite is favored to win by a 5 point spread.

20 The favorite's options available for purchase as indicated in FIG. 2 range from an option on the favorite doing no worse than losing by 11 points (i.e. "lose under 12 or win") 28 to an option on the favorite winning by at least 13 (i.e. "win by more than 12") 30. The "lose under 12 or
25 win" option has a strike price of \$88 and a trading value (intrinsic value plus time value) of \$17. The "win by more than 12" option has a strike price of \$112 and a trading value of \$.30. Since team A is the favorite, it is highly likely that team A will do no worse than losing by 11
30 points. Accordingly, the "lose under 12 or win" option has a high price. Similarly, because team A is only favored to win by 5 points, it is moderately unlikely that team A will actually win by more than 12. Accordingly, the "win by more than 12" option is fairly inexpensive.

Similarly, the underdog's options range from an option that the underdog will win by at least 10 (i.e. "win by more than 9") 32 to an option that the underdog will lose by less than 12 (i.e. "lose under 12 or win") 34 at the strike prices and trading values indicated. The apparent option that the underdog will win by at least 13 (i.e. "win by more than 12") 36 having an apparent strike price of \$88 is actually out-of-range as indicated by a trading price of \$0.0. Options having a price of \$0.0 cannot be purchased. As with the favorite's options, since the underdog is only a 5 point underdog, it is highly probable that it will not lose by more than 12. Accordingly, this option has a high trading price. Similarly, the probability that the underdog would win by more than 9 is quite low and, therefore, the price for this option is also quite low.

The strike prices appearing in the favorite's price column 24 of FIG. 2 are shown in row format in FIG. 3 at 40. The strike prices function as calibration constants, the range of which is empirically determined based on the probable volatility of scoring in the game. Although it is within the scope of the present invention to provide strike prices in one point increments, to do so would result in a potentially unmanageable number of options (from a player's prospective). Similarly, too coarse a strike price increment would result in options that were too insensitive to the movement of the market. Accordingly, in the embodiment of FIG. 2, since a basketball game is generally scored in 2 point increments, strike price increments are set at 3 points as a reasonable compromise between sensitivity to the movement of the market and the number of options necessary for an easily playable game.

The strike price of a "win" is arbitrarily set at \$100 with the remaining strike prices set at \$100 plus or minus the particular strike price increment. In the case of winning by an excess amount the strike prices are set at

\$100 plus the strike price increment and, in the case of losing by less than a set amount, the strike prices are set at \$100 minus the strike price increment. Thus, the strike price for the favorite to "win by more than three" is \$103,
5 "win by more than six" is \$106, etc. Similarly the strike price for the favorite to "lose by less than three" is \$97, "lose by less than 6" is \$94, etc.

The score index 42 is analogous to the current value of the underlying commodity of an option and is calculated
10 according to the formula:

$$IX = 100 + (FS-US);$$

where IX is the index for a particular option, FS is the favorite's current score and US is the underdog's current score. As shown in FIG. 3, where play has not
15 begun, FS-US is zero and the index is equal to 100.

The "in/out of the money" calculation ("I/O") is the equivalent of the intrinsic value of a real-life option, except that the signs are reversed. A option that is in the money shows up as having a negative "I/O" value and an
20 option that is out of the money shows up as having a positive I/O value. The value of the I/O variable in the game is equal to the strike price of each option minus the index (i.e., strike price minus the value of the commodity). Thus, where the score index exceeds the strike price of an
25 option on the favorite, the option holder is in the money. Where the strike price of an option on the favorite exceeds the score index, the option holder is out of money. (In this regard, the holder of options on the favorite is analogous to a futures trader holding "call" options. The
30 greater the magnitude by which the index (value of the commodity) exceeds the strike price (settlement price), the greater the value of the call option.)

The strike prices appearing in the underdog's price column 26 of FIG. 2 are shown in row format in FIG. 4 at 50.
35 As with the favorite's strike prices, the underdog's strike

prices function as calibration constants and move in increments that are the same as the favorite's strike price increments. The strike price of a "win" is set at \$100 with the remaining strike prices set at \$100 plus or minus the particular strike price increment. In the case of losing by less than a set amount, the strike prices are set at \$100 plus the particular strike price increment and, in the case of winning by an excess amount, the strike prices are set at \$100 minus the strike price increment. (Note that this is the opposite of the favorite's strike price formula). Thus, the strike price for the underdog to "win by more than three" is \$97, "win by more than six" is \$94, etc. Similarly the strike price for the underdog to "lose by less than three or win" is \$103, "lose by less than 6 or win" is \$106, etc.

The score index 52 is the same as the index used in the favorite's calculations.

$$IX = 100 + (FS - US);$$

where IX is the index for a particular option, FS is the favorite's current score and US is the underdog's current score. The value of the "in/out of the money" variable is equal to the index minus the strike price of each option (the opposite of the favorite's I/O calculation). Thus, where the score index exceeds the strike price of an option on the underdog, the option holder is out of the money. Where the strike price of an option on the underdog exceeds the score index, the option holder is in the money. (In this regard, the holder of options on the underdog is analogous to a futures trader holding "put" options. The greater the magnitude by which the strike price (settlement price) exceeds the index (value of the commodity) the greater the value of the put option.) As can be seen from the foregoing discussion, in the preferred embodiment of FIG. 2, the intrinsic value of the options are based predominantly on the current score of the sporting

event. However, it is within the scope of the present invention to model a market based on other parameters characteristic to a particular sporting event, such as the total number of points scored by all participants, the interval between participants (in a race), the number of hits, or shots on goal, or any other quantifiable parameter for determining the progress of a sporting event or the relative progress of its participants. Thus, as used herein, "score" means any quantifiable representation of the progress of a competitive event.

The foregoing method for calculating intrinsic value of an array of options for the purpose of an options trading game represents a substantial improvement over prior art games, by providing a simulated market that is based on a real, rather than a purely random event. Such a game, based only on the intrinsic value of the options would be suitable for play as a beginner's game. A most preferred embodiment of the present invention, however, includes a further refinement -- that of simulating the time value that the market would place on a particular option and calculating a premium based on the time value.

With reference to FIG. 3, the time decay factor for the favorite is equal to the original point spread multiplied by the ratio of minutes remaining in the game divided by the total length of the game, or expressed as a formula:

$$TD = IPS \times (TR/TT);$$

where TD is the time decay factor, IPS is the initial point spread, TR is the time remaining and TT is the total length of the game.

The accuracy formula factor 48 is a weighted multiplier equal to the 0.01 multiplied by the index multiplied by the time decay factor, or expressed as a formula:

$$AF = 0.01 (IX) \times (TD)$$

5 where AF is the accuracy factor, IX is the index and TD is the time decay factor calculated above. Thus, the favorite's accuracy factor is a measure of the percentage of the game remaining weighted by the original point spread. Where used, the accuracy factor provides a weighted straight
10 line depreciation of the time value of the options as the game progresses.

The final trading price 49 of a particular favorite's option is adjusted by one of two time dependent multipliers: the time decay factor or a time value multiplier. Which of
15 the two time dependent multipliers is used is determined by a series of screens based on the result of the I/O calculation. If the I/O variable is zero or a negative number, indicating the option is at or in the money, the trading price "P" is simply equal to the index minus the
20 strike price plus the time decay factor -- which is the same as the intrinsic value of the option (-I/O) plus the time decay factor:

$$P = IX - SP + TD = -(I/O) + TD$$

For all values of the in/out variable ("I/O") that are
25 greater than zero (out of the money), the trading price is equal to the accuracy factor multiplied by the time value multiplier. If the I/O variable is greater than 0 and less than or equal to 2 (i.e. out of the money by less than \$2) the time value multiplier is set equal to 0.8 and the
30 trading price of the option is equal to 80% of the accuracy factor. If I/O is greater than 2 and less than or equal to 5 (i.e. out of the money by \$2-5), the trading price of the option is equal to 60% of the accuracy factor. If I/O is greater than 5 and less than or equal to 8, the trading
35 price of the option is equal to 35% of the accuracy factor.

If I/O is greater than 8 and less than or equal to 11, the trading price of the option is equal to 15% of the accuracy factor. If I/O is greater than 11 and less than or equal to 14, the trading price of the option is equal to 5% of the accuracy factor. If I/O is greater than 14, the trading price of the first option greater than 14 is set equal to \$.10 (irrespective of the intrinsic value of the option) and the price of the remaining options greater than 14 are set to zero (out of range). Options with a purchase price of zero cannot be purchased.

As can be seen from FIG. 3, an option on the favorite to lose by less than 3 or win has a strike price of \$97. The index at the beginning of the game is always 100, because the score is always tied at the beginning of a game. Thus, according to the I/O formula, the lose by less than 3 option is in the money by \$3 (the intrinsic value of the option). Because the ratio of time remaining to total time is equal to unity at the beginning of a game, the result of the favorite's time decay formula at the beginning of the game is always equal to the initial point spread. Similarly, because the index is always 100 at the beginning of a game, and 0.01×100 is equal to unity, the result of the accuracy factor at the beginning of a game is always equal to the time decay value. Thus, at the beginning of a game having a point spread of 5, a favorite's option that is in the money by \$3 at the beginning of the game will have a price of \$8 (the initial point spread plus the intrinsic value of the option).

With reference to FIG. 4, the time decay factor for the underdog is equal to simply the ratio of minutes remaining in the game divided by the total length of the game, without an adjustment for the point spread, or expressed as a formula:

$$TD = (TR/TT);$$

where TD is the time decay factor, TR is the time remaining and TT is the total length of the game.

As with the favorite's options calculations, the accuracy formula factor 58 for the underdog is a weighted multiplier equal to the 0.01 multiplied by the index multiplied by the time decay factor, or expressed as a formula:

$$AF = 0.1 (IX) \times (TD)$$

where AF is the accuracy factor, IX is the index and TD is the time decay factor calculated above. Thus, where used, the underdog's accuracy factor provides an unweighted straight line depreciation of the time value of the options as the game progresses.

The final trading price 59 of the underdog options are also adjusted by one of two time dependent multipliers: The time decay factor or a time value multiplier. Which of the two time dependent multipliers is used is determined by a series of screens based on the result of the in/out of the money variable. If the in/out variable is zero or a negative number, indicating the option is at or in the money, the trading price "P" is simply equal to the strike price minus the index plus the time decay factor -- which is the same as the intrinsic value of the option (-I/O) plus the time decay factor:

$$P = SP - IX + TD = -(I/O) + TD$$

For all values of the I/O variable that are greater than zero (out of the money), the trading price is equal to the accuracy factor multiplied by the time value multiplier. If the I/O variable is greater than 0 and less than or equal to 2, the time value multiplier is set equal to 0.7 and, the trading price of the option is equal to 70% of the accuracy factor. If I/O is greater than 2 and less than or equal to 5, the trading price of the option is equal to 50% of the accuracy factor. If I/O is greater than 5 and less than or equal to 8, the trading price of the option is equal to 30%

of the accuracy factor. If I/O is greater than 8 and less than or equal to 11, the trading price of the option is equal to 10% of the accuracy factor. If I/O is greater than 11 and less than or equal to 14, the trading price of the option is equal to 3% of the accuracy factor. If I/O is greater than 14, the trading price of the first option greater than 14 is set equal to \$.10 and the price of the remaining options greater than 14 are set to zero (out of range). Options with a purchase price of zero cannot be purchased.

As can be seen from FIG. 4, for example, an option on the underdog to win by more than 3 has strike price of \$97. As discussed above, the index at the beginning of the game is always \$100, because the score is always tied at the beginning of a game. Thus, according to the I/O formula, the win by more than 3 option is out of the money by \$3 (i.e. it has negative intrinsic value). Because the ratio of time remaining to total time is equal to unity at the beginning of a game, the result of the time decay formula for the underdog at the beginning of the game is always equal to one. Similarly, because the index is always \$100 at the beginning of a game, and 0.01×100 is equal to unity, the result of the accuracy factor at the beginning of a game is always equal to the time decay value. Thus, at the beginning of a game an underdog option that is out of the money by \$3 at the beginning of the game will have a price of \$.50 (equal to the accuracy factor (1) multiplied by 0.5, (the time value multiplier for an option that is out of the money by \$2-5)).

The values of the time value multipliers, and the ranges to which each of the multipliers apply, as described in the preferred embodiment, are empirically determined. Generally, however, the further an option is out of the money, the less likely it is that the option will have intrinsic value at the end of the game and, therefore, the

less expensive it must be. Therefore, the limits on the time value multipliers are that they must be less than one (to prevent an out of the money option from being more costly than an in the money option) and they must be in descending order (to prevent an option that is further out of the money from being more costly than an option that is less out of the money). Accordingly, within the scope of the present invention, each of the time value multipliers could be from 0 to .99, provided the above criteria is met. Alternatively, the time value multipliers could be adjusted by a linear formula rather than a series of screens, or by a fuzzy logic program responsive to the trading activity. The magnitude of the multipliers discussed in the preferred embodiment provided sufficient discrimination to make a playable game, without excessive programming complexity.

Preferably, the host computer permits trading to take place before the beginning of the sporting event, during time outs, and during other breaks in the action, thus enabling the players to buy and sell their options throughout the event, yet still enjoy viewing the sporting event itself.

FIG. 5 depicts a player terminal display late in the third quarter of the simulated basketball game. The time remaining 20 is 16 minutes and the underdog team B is currently leading by 5 points. As can be seen from a comparison of FIG. 5 with FIG. 2, a feature of the present invention is that as out-of-range options accumulate due to a wide disparity in score or other factors, the out-of-range options roll off the screen and are replaced with new options appearing at the opposite end of the field.

FIG. 6 shows the calculations for the favorite's options. With reference to FIG. 6, the index 42 is now \$95. Thus the intrinsic value of an option on the favorite to lose by less than three or win is -\$2 (down from \$8 at the beginning). The time decay multiplier is 1.666667 -- the

point spread multiplied by the ratio of time remaining to total time, i.e. $5 \times (16/48)$. The accuracy factor is 1.583333 -- 0.01 multiplied by the index multiplied by the time decay multiplier, i.e. $0.01 \times (\$95) \times (1.66667)$. Since
5 the option is out of the money by \$2, the final trading price of the option at this point is the accuracy factor multiplied by the time value multiplier for the range of \$0-2 (i.e. $1.583333 \times 0.8 = 1.2667 = \1.30 rounded to the nearest \$.10). \$1.30 represents an 87% loss from the
10 original price of \$8.00.

FIG. 7 shows the calculations for the underdog options. The index 52 is still \$95. Thus, the intrinsic value of an option on the underdog winning by more than three is \$2 (up from \$.50 at the beginning of the event). The time decay
15 multiplier is .3333333 -- the ratio of time remaining to total time (i.e. $16/48$). The accuracy factor is .316777 -- 0.01 multiplied by the index multiplied by the time decay multiplier, i.e. $0.01 \times (\$95) \times (.333333)$. Since the option is in money, the trading price of the option is the
20 intrinsic value plus the time decay multiplier i.e. $\$2 + \0.31677 , or \$2.30 rounded to the nearest \$.10). \$2.30 represents a 460% increase over the original price of \$.50.

In another embodiment of the present invention, instead of the market being simulated predominantly by the
25 difference between the scores of the two teams in the basketball game, the market is simulated by the total score of the two teams. FIG. 8 shows an exemplary player's terminal display in a game based on the same sporting event as the embodiment of FIG. 2, with team A 16 and team B 18
30 playing. As with FIG. 2, the game begins with no score and remaining time 20 of 48 minutes. Instead of favorite and underdog options, however, the commodities options available in the game of FIG. 8 are options on whether the total points scored will exceed or fall short of a preselected
35 point total.

The "over" options available for purchase as indicated in FIG. 8 range from an option 70 on the total points scored exceeding 160 to an option 72 on the total points scored exceeding 240 points. The score over 160 points option has a strike price of 160 and a price of \$50.00. The score over 240 points option has a strike price of 240 and a price of \$.10. Since a typical basketball game averages about 200 total points, it is highly likely that at least 160 points will be scored. Accordingly, the "score over 160 points" option has a high price. Similarly, it is moderately unlikely that more than 240 points will be scored. Accordingly, the "score more than 240 points" option is fairly inexpensive.

The "under" options available for purchase as indicated in FIG. 8 range from an option 74 on the total points scored falling short of 160 to an option 76 on the total points scored falling short of 240 points. The score under 160 points option has a strike price of \$160 and a price of \$.10. The score under 240 points option has a strike price of 240 and a price of \$50.00. Since, as discussed above, a typical basketball game averages about 200 total points, it is highly unlikely that fewer than 160 points will be scored. Accordingly, the "score under 160 points" option has a low price. Similarly, it is highly probable that fewer than 240 points will be scored. Accordingly, the "score under 240 points" option is fairly expensive.

The "over" strike prices appearing in FIG. 8 are shown in row format in FIG. 9 at 80. The target score "TS" is empirically determined based on the average points likely to be scored in a particular game. As in the favorite/underdog game, the strike prices function as calibration constants, the range and increments of which are empirically determined based on a compromise between sensitivity to scoring and keeping the number of options to a manageable size. In the

embodiment of FIG. 8, the strike price increment is set to \$10.

The index 82 is a straight line extrapolation of the points scored during the time played thus far extrapolated to the end of the game. The index is equal to the total points scored in the game thus far divided by the time played thus far multiplied by the total time of the game, or expressed as a formula:

$$IX = TT \times (FS+US)/(TT-TR)$$

where IX is the index, TT is the total time for regulation play, TR is the time remaining, FS is the favorite's score, and US is the underdog's score. At the beginning of the game, there is no data from which to extrapolate a predicted final score. Accordingly, at the start of the game, the index is simply set to the empirically determined target score TS.

The in/out of the money calculation 84 is equal to the strike price minus the Index (SP-IX). The time decay formula is a straight ratio of the time remaining over the total time, multiplied by a scale factor of 10, i.e.

$$TD = 10 (TR/TT)$$

where TD is the time decay factor, TR is the time remaining and TT is the total time of the game.

The accuracy factor is calculated as follows:

$$AF = 0.01 (IX) \times (TD)$$

where AF is the accuracy factor, TD is the time decay factor, and IX is the index.

Finally the trading prices for the options 89 are adjusted by one of two time dependent multipliers: the time decay factor or a time value multiplier. Which of the two multipliers is used is determined by a series of screens based on the result of the in/out of the money variable. If the in/out variable is zero or negative, indicating the option is at or in the money, the trading price "P" is simply equal to the index minus the strike price plus the

time decay factor -- which is the same as the intrinsic value of the option $(-I/O)$ plus the time decay factor:

$$P = IX - SP + TD = -(I/O) + TD$$

For all values of the in/out variable ("I/O") that are greater than zero (out of the money), the trading price is equal to the accuracy factor multiplied by the time value multiplier. If the I/O variable is greater than 0 and less than or equal to 2, (out of the money by less than \$2) the time value multiplier is set equal to 0.9 and, the trading price of the option is equal to 90% of the accuracy factor. If I/O is greater than 2 and less than or equal to 9 (out of the money by \$2-9), the time value multiplier is equal to .65 and the trading price of the option is equal to 65% of the accuracy factor. If I/O is greater than 9 and less than or equal to 19, the trading price of the option is equal to 28% of the accuracy factor. If I/O is greater than 19 and less than or equal to 29, the trading price of the option is equal to 8% of the accuracy factor. If I/O is greater than 29 and less than or equal to 39, the trading price of the option is equal to 2% of the accuracy factor. If I/O is greater than 39, the trading price of the first option greater than 39 is set equal to \$.10 and the price of the remaining options greater than 39 are set to zero (out of range). As with the favorite/underdog game, options with a purchase price of zero cannot be purchased.

The "under" option strike prices appearing in FIG. 8 are shown in row format in FIG. 10 at 90. The index 92 for the under options is the same as the index for the "over" options. The in/out of the money calculation for the "under" options is the negative of the "over" option, namely the index minus the strike price. The time decay, accuracy factor, and final price are all calculated in the same manner as the time decay, accuracy factor, and final price for the "over options"

As can be seen with reference to FIGs. 11, 12 and 13, which depict the same moment in time as FIGs. 5, 6 and 7, the index is 217.5, indicating that the extrapolated score will exceed the 200 point target score. Accordingly, an
5 "over" option that the score will be over 210 has a price of \$10.80 (a 380% increase over the \$2.80 price at the beginning). However, an "under" option that the score would be under 210 has a price of \$4.70 (less than 24% of the original price of \$20.00). Fig. 14 and 15 depict exemplary
10 player's screens at the end of the game at which time the options are traded into the host and the winner determined based on which player accumulated the most simulated wealth.

As with the favorite/underdog game, the players attempt to time their buying and selling of options in response to
15 the movement of the simulated market, in order to maximize profits and accumulate the most wealth. At the end of the sporting event, the player that has amassed the most wealth is declared the winner.

For simplicity's sake in the description, the values
20 inputted into the variables for current score, total time, time remaining and other values derived from the sporting event are described as being "equal" to the actual values of those parameters. Obviously, all of the variables are scalable. Therefore, as long as the values derived from the
25 sporting event are proportional to the actual values, the sporting event will provide appropriate basis from which to simulate a market consistent with the present invention. Accordingly, for the purpose of interpreting the claims, where a variable that is inputted is stated as being "equal
30 to" the current score, total time, time remaining, or any other external variable relating to the particular sporting event being used as the basis for simulating the definition also includes "proportional to" that value.

Although certain preferred embodiments and methods have
35 been disclosed herein, it will be apparent from the

foregoing disclosure to those skilled in the art that variations and modifications of such embodiments and methods may be made without departing from the true spirit and scope of the invention. For example, consistent with the use of "score" herein meaning any quantifiable indication of the progress of a competition, sporting events that do not have a score in points, but have a winner based on elapsed time, or based on the first to cross a finish line, such as in a sailboat race, may be used to model the market in accordance with the present invention. As discussed with reference to FIGs. 8-13 the market can be modeled based on total points accumulated by both teams rather than the scores of both. Similarly, the market can be modeled based on parameters that do not determine the winner of an event, such as the number of hits or errors in a baseball game. Accordingly, it is intended that the invention shall be limited only to the extent required by the appended claims and the rules and principles of applicable law.

What is claimed is:

1 1. A sports options trading game that uses a sporting
2 event as a basis for simulating a market and is playable by
3 a plurality of players each having data terminal, said game
4 comprising:

5 means for allocating to each of said plurality of
6 players a predetermined sum of simulated money displayed as
7 a field on said data terminal;

8 means for providing an array of simulated
9 commodities options available for purchase, said options
10 being displayed as a plurality of fields on said data
11 terminals;

12 means responsive to said sporting event for
13 calculating a plurality of intrinsic option prices based on
14 values comprising a plurality of predetermined option strike
15 prices and a current score in said sporting event;

16 means for displaying said intrinsic option prices
17 on said data terminals;

18 means for providing each player with an
19 opportunity to buy and sell said options at said intrinsic
20 option prices by inputting information into said data
21 terminal, wherein said players attempt to accumulate the
22 most simulated wealth by buying and selling said options at
23 favorable prices as said prices fluctuate in response to
24 said progress of said sporting event; and

25 means for terminating the game when said sporting
26 event ends and determining a winner of said game.

1 2. The sports options trading game of claim 1 further
2 including:

3 means for calculating a time dependent multiplier
4 for said options; and

5 means for adjusting said plurality of intrinsic
6 option prices based on said time dependent multiplier to
7 arrive at a plurality of final option prices.

1 3. The sports options trading game of claim 2 wherein
2 said sporting event includes a favorite and an underdog
3 participant and wherein said means for calculating said time
4 dependent multiplier for said favorite comprises a computer
5 executable algorithm that is a function of a plurality of
6 sporting event indexed values, said sporting event indexed
7 values comprising an initial point spread, a time remaining
8 figure, and a total time figure, said initial point spread
9 having a value equal to a point spread determined from said
10 preselected sporting event, said total time figure having a
11 value equal to the total time of the preselected sporting
12 event, and said time remaining figure having a value equal
13 to the time remaining in said preselected sporting event.

1 4. The sports options trading game of claim 3 wherein
2 said sporting event indexed values further include an
3 empirically determined multiplier the value of which is
4 selected based on said intrinsic option prices.

1 5. The sports options trading game of claim 2 wherein
2 said sporting event includes a favorite and an underdog
3 participant and wherein said means for calculating said time
4 value for said underdog comprises a computer executable
5 algorithm that is a function of a plurality of sporting
6 event indexed values, said sporting event indexed values
7 comprising an initial point spread, a time remaining figure,
8 and a total time figure, said initial point spread having a
9 value equal to a point spread determined from said
10 preselected sporting event, said total time figure having a
11 value equal to the total time of the preselected sporting
12 event, and said time remaining figure having a value equal
13 to the time remaining in said preselected sporting event.

1 6. The sports options trading game of claim 5 wherein
2 said sporting event indexed values further include an

3 empirically determined multiplier the value of which is
4 selected based on said intrinsic option prices.

1 7. The sports options trading game of claim 1 wherein
2 said score comprises the points scored by a participant in
3 said sporting event.

1 8. The sports options trading game of claim 1 wherein
2 said score comprises an aggregate of points scored by all
3 participants in said sporting event.

1 9. The sports options trading game of claim 1 wherein
2 said sporting event comprises a basketball game and said
3 incidents in said sporting event comprise a current score,
4 the total length of time in a basketball game for regulation
5 play and the time remaining in regulation play.

1 10. The sports options trading game of claim 1 wherein
2 said sporting event comprises a football game and said
3 incidents in said sporting event comprise a current score,
4 the total length of time in a football game for regulation
5 play and the time remaining in regulation play.

1 11. The sports options trading game of claim 1 wherein
2 said sporting event comprises a baseball game and said
3 incidents in said sporting event comprise a current score,
4 the total number of innings in a baseball game for
5 regulation play and the number of innings remaining in
6 regulation play.

1 12. The sports options trading game of claim 1 wherein
2 said sporting event comprises a sailboat regatta and said
3 incidents in said sporting event comprise the lead time held
4 by the leading boat, the total number of buoys to be rounded

5 in a regulation race and the number of buoys to be rounded
6 in a race.

1 13. The sports options trading game of claim 1 wherein
2 said sporting event comprises a golf game and said incidents
3 in said sporting event comprise the number of strokes for a
4 predetermined golfer and the number of holes left to play.

1 14. The sports options trading game of claim 2 wherein
2 said score comprises the points scored by a participant in
3 said sporting event.

1 15. The sports options trading game of claim 2 wherein
2 said score comprises an aggregate of points scored by all
3 participants in said sporting event.

1 16. The sports options trading game of claim 2 wherein
2 said sporting event comprises a basketball game and said
3 incidents in said sporting event comprise a current score,
4 the total length of time in a basketball game for regulation
5 play and the time remaining in regulation play.

1 17. The sports options trading game of claim 2 wherein
2 said sporting event comprises a football game and said
3 incidents in said sporting event comprise a current score,
4 the total length of time in a football game for regulation
5 play and the time remaining in regulation play.

1 18. The sports options trading game of claim 2 wherein
2 said sporting event comprises a baseball game and said
3 incidents in said sporting event comprise a current score,
4 the total number of innings in a baseball game for
5 regulation play and the number of innings remaining in
6 regulation play.

1 19. A method of playing an options trading game using
2 a sporting event as a basis for simulating a market and
3 playable by a plurality of players each having data
4 terminal, said method comprising:

5 allocating to each of said plurality of players a
6 predetermined sum of simulated money displayed as a field on
7 said data terminal;

8 providing an array of options available for
9 purchase, said options being displayed as a plurality of
10 fields on said data terminals;

11 inputting into a host computer a plurality of
12 option strike prices each having a predetermined value;

13 inputting a score into said host computer, said
14 score having a value equal to a current score in a
15 preselected sporting event;

16 calculating a plurality of intrinsic option prices
17 based on values comprising said plurality of predetermined
18 option strike prices and said current score in said sporting
19 event, said option prices being displayed as a plurality of
20 fields on said data terminals corresponding to said options
21 available for purchase;

22 providing each player with an opportunity to buy
23 and sell said options at said option prices by inputting
24 information into said data terminal, wherein said players
25 attempt to accumulate the most simulated wealth by buying
26 and selling said options at favorable prices as said prices
27 fluctuate in response to said sporting event;

28 terminating the game when said preselected
29 sporting event ends.

1 20. The method of claim 19 further including:

2 calculating a time dependent multiplier for said
3 options; and

- 4 adjusting said plurality of intrinsic option
- 5 prices based on said time dependent multiplier to arrive at
- 6 a plurality of final option prices.

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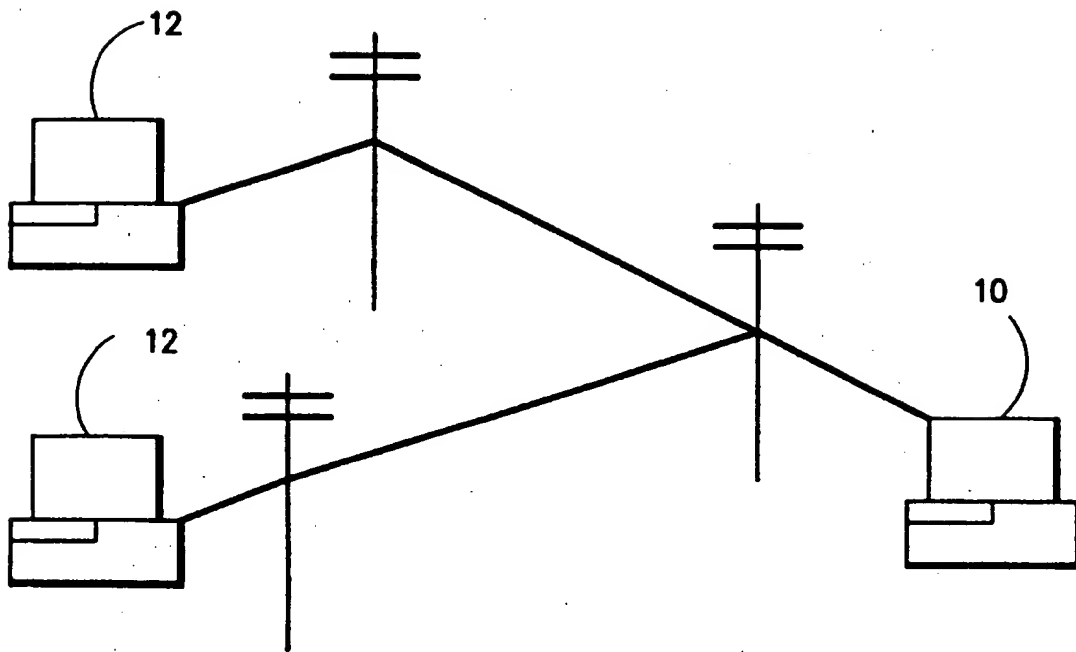


FIG. 1

SUBSTITUTE SHEET (RULE 26)

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16
18
20
14
22

24
28

30
26
36
32
34

Player Game

Results

(A) 0 **Point Spread** : 5.0

(B) 0 **Set Over Und** : 200

Minutes Left : 48

Total Points : 0

Current Holdings

Current Balance : 1000.00

Shrs Price : ID F/U

Value

Prices

Favorites Price : A

Lose under 12 or Win 88

Lose under 9 or Win 91

Lose under 6 or Win 94

Lose under 3 or Win 97

Win by 1 or more 100

Win by more than 3 103

Win by more than 6 106

Win by more than 9 109

Win by more than 12 112

Net Worth \$ 1000.00

Underdogs Price : B

Win by more than 12 88

Win by more than 9 91

Win by more than 6 94

Win by more than 3 97

Win by 1 or more 100

Lose under 3 or Win 103

Lose under 6 or Win 106

Lose under 9 or Win 109

Lose under 12 or Win 112

17.0

14.0

11.0

8.0

5.0

3.0

1.8

0.8

0.3

FIG. 2

5/15

20

Player Game																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">A</td> <td style="width: 10%;">70</td> <td style="width: 10%;">Point Spread : 5.0</td> </tr> <tr> <td>B</td> <td>75</td> <td>Set Over Und : 200</td> </tr> <tr> <td colspan="2" style="border: 1px solid black;">Minutes Left</td> <td>Total Points : 145</td> </tr> </table>	A	70	Point Spread : 5.0	B	75	Set Over Und : 200	Minutes Left		Total Points : 145	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: left;">Results</th> </tr> <tr> <td style="width: 30%;">Current Holdings</td> <td>1000.00</td> </tr> <tr> <td>Current Balance</td> <td></td> </tr> <tr> <td>Shrs Price</td> <td>ID F/U</td> </tr> <tr> <td>Value</td> <td></td> </tr> <tr> <td>Net Worth</td> <td>\$ 1000.00</td> </tr> </table>	Results		Current Holdings	1000.00	Current Balance		Shrs Price	ID F/U	Value		Net Worth	\$ 1000.00																			
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FIG. 5

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FIG. 6

SCREEN PRINT #7

INPUTS:

FAVORITE'S SCORE 70

UNDERDOG'S SCORE 75

MINUTES LEFT 16

POINT SPREAD 5

SET OVER UNDER 200

FAVORITE'S OPTIONS:

12 OR WIN 88

9 OR WIN 91

6 OR WIN 94

3 OR WIN 97

WIN BY MORE THAN 1 OR MORE 100

WIN BY MORE THAN 3 103

WIN BY MORE THAN 6 106

WIN BY MORE THAN 9 109

WIN BY MORE THAN 12 112

STRIKE PRICE 88

EXPLANATION OF FORMULA TO CALCULATE INDEX

FAVORITE'S SCORE MINUS UNDERDOG'S SCORE PLUS 100 (EXPLANATION IS SAME FOR ALL STRIKE PRICES)

95 95 95 95 95 95 95 95 95 95

EXPLANATION OF IN/OUT OF THE MONEY

STRIKE PRICE MINUS THE INDEX (EXPLANATION IS THE SAME FOR ALL STRIKE PRICES)

7 -4 -1 2 5 8 11 14 17

EXPLANATION OF FORMULA TO CALCULATE POINT SPREAD

POINT SPREAD MULTIPLIED BY MINUTES LEFT DIVIDED BY TOTAL MINUTES IN PRO BASEBALL GAME WHICH IS 48 (SAME FOR ALL STRIKE)

1.000000007 1.000000007 1.000000007 1.000000007 1.000000007 1.000000007 1.000000007 1.000000007 1.000000007

EXPLANATION OF ACTUALITY FACTOR FORMULA

RESULT OF TIME DELAY ON POINT SPREAD MULTIPLIED BY RESULT OF INDEX CALCULATION MULTIPLIED BY .01 (SAME FOR ALL STRIKE)

1.500000003 1.500000003 1.500000003 1.500000003 1.500000003 1.500000003 1.500000003 1.500000003 1.500000003

EXPLANATION OF FULL PRICE CALCULATION

IF RESULT OF IN/OUT IS EQUAL TO OR LESS THAN ZERO THEN TAKE RESULT OF INDEX MINUS STRIKE PRICE PLUS RESULT OF TIME DELAY ON POINT SPREAD

IF RESULT OF IN/OUT OF MONEY IS GREATER THAN ZERO AND LESS THAN OR EQUAL TO 2 TAKE RESULT OF ACTUALITY FACTOR FORMULA MULTIPLIED BY .8

IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 2 AND LESS THAN OR EQUAL TO 5 TAKE RESULT OF ACTUALITY FACTOR FORMULA MULTIPLIED BY .6

IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 5 AND LESS THAN OR EQUAL TO 8 TAKE RESULT OF ACTUALITY FACTOR FORMULA MULTIPLIED BY .35

IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 8 AND LESS THAN OR EQUAL TO 11 TAKE RESULT OF ACTUALITY FACTOR FORMULA MULTIPLIED BY .15

IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 11 AND LESS THAN OR EQUAL TO 14 TAKE RESULT OF ACTUALITY FACTOR FORMULA MULTIPLIED BY .05

IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 14 MAKE THE RESULT EQUAL .1 AND MAKE ALL HIGHER STRIKE PRICES EQUAL ZERO

8.7 5.7 2.7 1.3 1.0 0.6 0.2 0.1 0.0

RESULT IS CURRENT PRICE (ROUNDED)

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FIG. 7

INPUTS:														
FAVORITE'S SCORE	70	WIN BY MORE	WIN BY MORE	WIN BY MORE	WIN BY 1 OR	LOSE UNDER	LOSE UNDER	LOSE UNDER	LOSE UNDER	LOSE UNDER	LOSE UNDER	LOSE UNDER	LOSE UNDER	LOSE UNDER
UNDERDOG'S SCORE	76	THAN 12	THAN 9	THAN 6	THAN 3	3 OR WIN	6 OR WIN	9 OR WIN	12 OR WIN	12 OR WIN	12 OR WIN	12 OR WIN	12 OR WIN	12 OR WIN
MINUTES LEFT	16													
POINT SPREAD	5													
SET OVER UNDER	200													
UNDERDOG'S OPTION: WIN BY MORE THAN 12														
STRIKE PRICE	88	91	94	97	100	103	106	109	112					
EXPLANATION OF FORMULA TO CALCULATE INDEX														
INDEX														
FAVORITE'S SCORE MINUS UNDERDOG'S SCORE PLUS 100 (EXPLANATION IS SAME FOR ALL STRIKE PRICES)														
RESULT OF INDEX CALCULATION	85	85	85	85	85	85	85	85	85					
EXPLANATION OF IN/OUT OF THE MONEY														
INDEX MINUS THE STRIKE PRICE (EXPLANATION IS THE SAME FOR ALL STRIKE PRICES)														
RESULT OF IN/OUT OF MONEY FORMULA	7	4	1	-2	-5	-8	-11	-14	-17					
EXPLANATION OF FORMULA TO CALCULATE THE DELAY ON POINT SPREAD														
MINUTES LEFT DIVIDED BY TOTAL MINUTES IN PRO BASKETBALL GAME WHICH IS 48														
POINT SPREAD														
RESULT OF THE DELAY ON POINT SPREAD	0.3555555555	0.3555555555	0.3555555555	0.3555555555	0.3555555555	0.3555555555	0.3555555555	0.3555555555	0.3555555555					
EXPLANATION OF ACCURACY FACTOR FORMULA														
RESULT OF THIS DELAY ON POINT SPREAD MULTIPLIED BY RESULT OF INDEX CALCULATION MULTIPLIED BY .01 (SAME FOR ALL STRIKES)														
ACCURACY FACTOR	0.316666667	0.316666667	0.316666667	0.316666667	0.316666667	0.316666667	0.316666667	0.316666667	0.316666667					
EXPLANATION OF FULL PRICE CALCULATION														
RESULT OF FULL PRICE CALCULATION	0.1	0.2	0.2	2.3	5.3	8.3	11.3	14.3	17.3					
EXPLANATION OF FULL PRICE CALCULATION														
IF RESULT OF IN/OUT IS EQUAL TO OR LESS THAN ZERO THEN TAKE RESULT OF STRIKE PRICE MINUS INDEX PLUS RESULT OF THE DELAY ON POINT SPREAD														
IF RESULT OF IN/OUT OF MONEY IS GREATER THAN ZERO AND LESS THAN OR EQUAL TO 2 TAKE RESULT OF ACCURACY FACTOR FORMULA MULTIPLIED BY .7														
IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 2 AND LESS THAN OR EQUAL TO 5 TAKE RESULT OF ACCURACY FACTOR FORMULA MULTIPLIED BY .5														
IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 5 AND LESS THAN OR EQUAL TO 8 TAKE RESULT OF ACCURACY FACTOR FORMULA MULTIPLIED BY .3														
IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 8 AND LESS THAN OR EQUAL TO 11 TAKE RESULT OF ACCURACY FACTOR FORMULA MULTIPLIED BY .1														
IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 11 AND LESS THAN OR EQUAL TO 14 TAKE RESULT OF ACCURACY FACTOR FORMULA MULTIPLIED BY .03														
IF RESULT OF IN/OUT OF MONEY IS GREATER THAN 14 MAKE THE RESULT EQUAL .1 AND MAKE ALL HIGHER STRIKE PRICES EQUAL ZERO														

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16 18 20
70

Results

0 Point Spread : 5.0

0 Set Over Und : 200

48 Total Points : 0

Minutes Left

Player Game

Current Holdings

Current Balance 1000.00

Shrs Price ID F/U

Net Worth \$ 1000.00

Prices

Total Points: 0

Over 160 Points Total	160
Over 170 Points Total	170
Over 180 Points Total	180
Over 190 Points Total	190
Over 200 Points Total	200
Over 210 Points Total	210
Over 220 Points Total	220
Over 230 Points Total	230
Over 240 Points Total	240

Under 160 points Total

Under 160 points Total	160
Under 170 Points Total	170
Under 180 Points Total	180
Under 190 Points Total	190
Under 200 Points Total	200
Under 210 Points Total	220
Under 220 Points Total	220
Under 230 Points Total	230
Under 240 Points Total	240

FIG. 8

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FIG. 10

[illegible]

12/15

FIG. 12

[illegible]

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Player Game			
Results		Prices	
A	105	Favorites Price : A	5.0
B	94	Win by more than 6 -->	106
Minutes Left	0	Win by more than 9 -->	109
		Win by more than 12 -->	112
		Win by more than 15 -->	115
		Win by more than 18 -->	118
		Win by more than 21 -->	121
		Win by more than 24 -->	124
		Win by more than 27 -->	127
		Win by more than 30 -->	130
		Underdogs Price : B	0.0
		Lose under 6 or Win -->	106
		Lose under 9 or Win -->	109
		Lose under 12 or Win -->	112
		Lose under 15 or Win -->	115
		Lose under 18 or Win -->	118
		Lose under 21 or Win -->	121
		Lose under 24 or Win -->	124
		Lose under 27 or Win -->	127
		Lose under 30 or Win -->	130
Current Holdings			
Current Balance		1000.00	
Shrs Price	ID F/U	Value	
Net Worth	\$	1000.00	

FIG. 14

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Results		Current Holdings		Current Balance		Net Worth	
A	105	Point Spread :	5.0	Shrs	Price	ID	F/U
B	94	Set Over Und :	200	Value			
Minutes Left	0	Total Points :	199	1000.00			
				1000.00			

Player Game		Prices	
Total	Points : 199	Total	Points
Over	160 Points	Over	160
Over	170 Points	Over	170
Over	180 Points	Over	180
Over	190 Points	Over	190
Over	200 Points	Over	200
Over	210 Points	Over	210
Over	220 Points	Over	220
Over	230 Points	Over	230
Over	240 Points	Over	240
Under	160 Points	Under	160
Under	170 Points	Under	170
Under	180 points	Under	180
Under	190 Points	Under	190
Under	200 Points	Under	200
Under	210 Points	Under	210
Under	220 Points	Under	220
Under	230 Points	Under	230
Under	240 Points	Under	240

FIG. 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/04742

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A63F 9/00

US CL :463/1, 9, 25, 42

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 273/278, 297; 364/410, 412; 434/107; 463/1, 9, 22, 25, 40-42

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,378,942 A (ISAAC) 05 April 1983, entire document.	1-20
A	US 4,592,546 A (FASCENDA et al.) 03 June 1986, entire document.	1-20
A	US 5,013,038 A (LUXENBERG et al.) 07 May 1991, entire document.	1-20
A	US 5,018,736 A (PEARSON et al.) 28 May 1991, entire document.	1-20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

11 MAY 1997

Date of mailing of the international search report

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